Math Bank - I

1. If cosec $\theta = x + \frac{1}{4x}$ then the value of cosec θ + cot θ is
(a) $2x$ (b) $-2x$
(c) $\frac{1}{2x}$ (d) $-\frac{1}{2x}$

2. If $\alpha + \beta = 90°$, then the maximum value of $\sin\alpha \sin\beta$ is
(a) 1 (b) $\frac{1}{2}$
(c) $\frac{3}{2}$ (d) none of these

3. The inequality $2^{\sin\theta} + 2^{\cos\theta} \geq 2^{\left(1-\frac{1}{\sqrt{2}}\right)}$ holds for
(a) $0 \leq \theta < \pi$ (b) $\pi \leq \theta < 2\pi$
(c) for all real θ (d) none of these

4. If $A = \cos^2\theta + \sin^4\theta$, then for all values of θ
(a) $1 \leq A \leq 2$ (b) $\frac{13}{16} \leq A \leq 1$
(c) $\frac{3}{4} \leq A \leq \frac{13}{16}$ (d) $\frac{3}{4} \leq A \leq 1$

5. If $u_n = 2\cos n\theta$ then $u_1 u_n - u_{n-1}$ is equal to
(a) u_{n-2} (b) u_{n+1}
(c) 0 (d) none of these

6. If $y = 4\sin^2\theta - \cos 2\theta$, then y lies in the interval
(a) $(-1, 5)$
(b) $[-1, 5]$
(c) $(-\infty, -1) \cup (5, \infty)$
(d) none of these

7. If for real values of x, $\cos\theta = x + \frac{1}{x}$, then
(a) θ is an acute angle
(b) θ is a right angle
(c) θ is an obtuse angle
(d) no value of θ is possible

8. The number of solutions of the equation
$\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$, is
(a) 3 (b) 2
(c) 1 (d) 0

9. The value of θ satisfying $\cos\theta + \sqrt{3}\sin\theta = 2$ is
(a) $\frac{5\pi}{3}$ (b) $\frac{4\pi}{3}$
(c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{3}$

10. The range of y such that the following equation in x, $y + \cos x = \sin x$ has a real solution, is
(a) $-2 \leq y \leq 2$ (b) $-\sqrt{2} \leq y \leq \sqrt{2}$
(c) $-1 \leq y \leq 1$ (d) $y \in \phi$

11. If $\cos 40° = x$ and $\cos\theta = 1-2x^2$, then the possible values of θ lying between 0° and 360° are
(a) 100° and 260° (b) 80° and 280°
(c) 280° and 110° (d) 110° and 260°

12. Solution of the equation $2\tan^{-1}(\cos x) = \tan^{-1}(2\,\text{cosec}\,x)$ is
(a) $x = 2n\pi + \frac{\pi}{4}$ (b) $x = n\pi + \frac{\pi}{4}$
(c) $x = n\pi + \frac{\pi}{2}$ (d) none of these

13. $4\tan^{-1}\left(\frac{1}{5}\right) - \tan^{-1}\left(\frac{1}{70}\right) + \tan^{-1}\left(\frac{1}{99}\right) =$
(a) π (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$

14. $3\cos^{-1}x - \pi x - \frac{\pi}{2} = 0$ has
(a) one solution
(b) one and only one solution
(c) no solution
(d) more than one solution

15. $\tan\left[\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right] + \tan\left[\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\frac{a}{b}\right] =$
(a) $\frac{2a}{b}$ (b) $\frac{2b}{a}$
(c) $\frac{a}{b}$ (d) $\frac{b}{a}$

16. If the angles of a triangle are in the ratio of 2 : 3 : 7, then the sides are in the ratio of
(a) $\sqrt{2} : 2 : (\sqrt{3} + 1)$ (b) $2 : \sqrt{2} : (\sqrt{3} + 1)$
(c) $\sqrt{2} : (\sqrt{3} + 1) : 2$ (d) $2 : (\sqrt{3} + 1) : \sqrt{2}$

17. In ΔABC, $b\cos^2\frac{C}{2} + c\cos^2\frac{B}{2} =$
(a) $3s$ (b) $2s$
(c) s (d) none of these

18. If in ΔABC, $3\sin A = 6\sin B = 2\sqrt{3}\sin C$, then angle A is
(a) 0° (b) 30°
(c) 60° (d) 90°

19. The lengths of the sides of a triangle are x, y and

$\sqrt{x^2+y^2+xy}$. The measure of the greatest angle is

(a) 120º (b) 150º

(c) 135º (d) none of these

20. An aeroplane flying at a height of 300 metres above the ground passes vertically above another plane at an instant when the angle of elevation of the two planes from the same point on the ground are 60º and 45º respectively. Then the height of the lower plane from the ground is (in metres)

(a) $100\sqrt{3}$ (b) $\frac{100}{\sqrt{3}}$

(c) 50 (d) 150 ($\sqrt{3}$ + 1)

21. The angle of elevation of a cloud at a point 2500 m high above a lake is 15º, and the angle of depression of its image in the lake is 45º, the height of the cloud above the surface of the lake is

(a) $2500\sqrt{3}$ m (b) 2500 m

(c) $500\sqrt{3}$ m (d) 500 m

22. A ladder rests against a wall making an angle α with the horizontal. The foot of the ladder is pulled away from the wall through a distance x, so that it slides a distance y down the wall making an angle β with the horizontal. The correct relation is

(a) $x = y\tan\frac{\alpha+\beta}{2}$ (b) $y = x\tan\frac{\alpha+\beta}{2}$

(c) $x = y\tan(\alpha + \beta)$ (d) $y = x\tan(\alpha + \beta)$

23. The angular depressions of the top and the foot of a chimney as seen from the top of a second chimney, which is 150 *m* high and standing on the same level as the first are θ and ϕ respectively, then the distance between their tops when $\tan\theta = \frac{4}{3}$ and $\tan\phi = \frac{5}{2}$, is

(a) $\frac{150}{\sqrt{3}}$ *metres* (b) $100\sqrt{3}$ *metres*

(c) 150 *metres* (d) 100 metres

24. The ends of a rod of length l move on two mutually perpendicular lines. The locus of the point on the rod which divides it in the ratio 1 : 2 is

(a) $\frac{x^2}{1}+\frac{y^2}{4} = \frac{l^2}{9}$ (b) $\frac{x^2}{4}+\frac{y^2}{1} = \frac{l^2}{9}$

(c) $\frac{x^2}{1}-\frac{y^2}{4} = \frac{l^2}{9}$ (d) $\frac{x^2}{4}-\frac{y^2}{1} = \frac{l^2}{9}$

25. If the point A is symmetric to the point B (4, – 1) with respect to the bisector of the first quadrant, then the length of AB is

(a) 5 (b) $5\sqrt{2}$

(c) $3\sqrt{2}$ (d) 3

26. The image of the point (3, – 8) under the transformation $(x, y) \to (2x + y, 3x - y)$ is

(a) (– 2, 17) (b) (2, 17)

(c) (– 2, – 17) (d) (2, – 17)

27. Let P be the image of the point (– 3, 2) with respect to x-axis. Keeping the origin as same, the coordinate axes are rotated through an angle 60º in the clockwise sense. The coordinates of point P with respect to the new axes are

(a) $\left(\frac{2\sqrt{3}-3}{2}, -\frac{(3\sqrt{3}+2)}{2}\right)$

(b) $\left(\frac{2\sqrt{3}-3}{2}, \frac{3\sqrt{3}+2}{2}\right)$

(c) $\left(-\frac{(2\sqrt{3}-3)}{2}, \frac{3\sqrt{3}+2}{2}\right)$

(d) none of these

28. Equations of pair of lines passing through (3, 4) and parallel to the lines $x^2 - y^2 = 0$

(a) $x^2 - y^2 - 6x + 8y - 9 = 0$

(b) $x^2 - y^2 - 6x + 8y - 7 = 0$

(c) $x^2 - y^2 - 4x + 8y - 1 = 0$

(d) $x^2 - y^2 - 6x + 7y - 11 = 0$

29. The point of intersection of the pair of straight lines given by the equation $6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$, is

(a) (1, 1) (b) (1, – 1)

(c) (– 1, 1) (d) (– 1, – 1)

30. The equation $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$, where λ is a real number, represents a pair of straight lines. If θ is the angle between the lines, then $\text{cosec}^2\,\theta$ =

(a) 3 (b) 9

(c) 10 (d) 100

31. The difference of the tangents of the angles which the lines

$$x^2(\sec^2\theta - \sin^2\theta) - 2xy\tan\theta + y^2\sin^2\theta = 0$$

make with the x-axis is

(a) $2\tan\theta$ (b) 2

(c) $2\cot\theta$ (d) $\sin 2\theta$

32. The equation of the circle which touches the axis of y at a distance + 4 from the origin and cuts off an intercept 6 from the axis of x is

(a) $x^2 + y^2 - 10x - 8y + 16 = 0$

(b) $x^2 + y^2 + 10x - 8y + 16 = 0$

(c) $x^2 + y^2 - 10x + 8y + 16 = 0$

(d) none of these

33. The line joining (5, 0) and ($10\cos\theta$, $10\sin\theta$) is divided internally in the ratio 2 : 3 at P. If θ varies, then the locus of P is

(a) a pair of straight lines
(b) a circle
(c) a straight line
(d) none of these

34. The equation of the tangent, from the point (0, 1) to the circle $x^2 + y^2 - 2x - 6y + 6 = 0$, is

(a) $y - 1 = 0$ (b) $4x + 3y + 3 = 0$
(c) $4x + 3y - 3 = 0$ (d) $y + 1 = 0$

35. If the tangents PA and PB are drawn from the point P (– 1, 2) to the circle $x^2 + y^2 + x - 2y - 3 = 0$ and C is the centre of the circle, then the area of the quadrilateral $PACB$ is

(a) 4 (b) 16
(c) does not exist (d) none of these

36. If the focal distance of a point on a parabola $y^2 = 4x$ is 6, then the coordinates of the point are

(a) $(5, 2\sqrt{5})$ (b) $(5, -2\sqrt{5})$
(c) $(5, \sqrt{5})$ (d) none of these

37. If the point (at^2, $2at$) be one extremity of a focal chord of the parabola $y^2 = 4ax$, then the length of the chord is

(a) $a\left(t+\dfrac{1}{t}\right)^2$ (b) $a\left(t-\dfrac{1}{t}\right)^2$
(c) $2a\left(t-\dfrac{1}{t}\right)^2$ (d) none of these

38. Two tangents are drawn from the point (– 2, – 1) to the parabola $y^2 = 4x$. If α is the angle between them, then $\tan\alpha =$

(a) 3 (b) 1/3
(c) 2 (d) 1/2

39. With respect to the parabola $y^2 = 2x$, the points P (4, 2) and Q (1, 4) are such that

(a) P and Q both lie inside the parabola
(b) P lies inside whereas Q lies outside the parabola
(c) P lies outside whereas Q lies inside the parabola
(d) P and Q both lie outside the parabola

40. The domain of the function $f(x) = \sqrt{x - \sqrt{1-x^2}}$ is

(a) $\left[-1, -\dfrac{1}{\sqrt{2}}\right] \cup \left[\dfrac{1}{\sqrt{2}}, 1\right]$
(b) [– 1, 1]
(c) $\left(-\infty, -\dfrac{1}{2}\right] \cup \left[\dfrac{1}{\sqrt{2}}, +\infty\right)$
(d) $\left[\dfrac{1}{\sqrt{2}}, 1\right]$

41. The domain of the function

$f(x) = \log_{1/2}\left(x - \dfrac{1}{2}\right) + \log_2 \sqrt{4x^2 - 4x + 5}$ is

(a) $\left[\dfrac{1}{2}, \infty\right)$ (b) $\left(\dfrac{1}{2}, \infty\right)$
(c) $(-\infty, \infty)$ (d) none of these

42. The domain of definition of $f(x) = \sqrt{\dfrac{1-|x|}{2-|x|}}$ is

(a) $(-\infty, \infty)\backslash[-1, 1]$ (b) $(-\infty, \infty)\backslash[-2, 2]$
(c) $[-1, 1] \cup (-\infty, -2) \cup (2, \infty)$
(d) none of these

43. The domain of the function $f(x) = \sqrt{e^{\sin^{-1}(\log_{16} x^2)}}$ is

(a) $\left[\dfrac{1}{4}, 4\right]$ (b) $\left[-4, -\dfrac{1}{4}\right] \cup \left[\dfrac{1}{4}, 4\right]$
(c) $\left[-4, -\dfrac{1}{4}\right]$ (d) none of these

44. If α is a repeated root of $ax^2 + bx + c = 0$, then

$$\lim_{x\to\alpha} \frac{\tan(ax^2+bx+c)}{(x-\alpha)^2} \text{ is}$$

(a) a (b) b
(c) c (d) 0

45. $\displaystyle\lim_{x\to 2} \frac{\sqrt[3]{10-x}-2}{x-2}$ is equal to

(a) $\dfrac{1}{12}$ (b) $-\dfrac{1}{12}$
(c) $\dfrac{1}{6}$ (d) $-\dfrac{1}{6}$

46. The value of

$$\lim_{n\to\infty} \frac{1}{n^4}\left[1\left(\sum_{k=1}^{n} k\right) + 2\left(\sum_{k=1}^{n-1} k\right) + 3\left(\sum_{k=1}^{n-2} k\right) + \ldots + n\cdot 1\right]$$

will be

(a) $\dfrac{1}{24}$ (b) $\dfrac{1}{12}$
(c) $\dfrac{1}{6}$ (d) $\dfrac{1}{3}$

47. If $[x]$ denotes the integral part of x, then

$$\lim_{n\to\infty} \frac{1}{n^3}\left(\sum_{k=1}^{n} [k^2 x]\right) =$$

(a) 0 (b) $\dfrac{x}{2}$
(c) $\dfrac{x}{3}$ (d) $\dfrac{x}{6}$

48. If $f(x) = \begin{cases} \dfrac{1-\sin x}{(\pi-2x)^2}, & \text{when } x \neq \dfrac{\pi}{2} \\ \lambda, & x = \dfrac{\pi}{2} \end{cases}$, then $f(x)$ will be a continuous function at $x = \dfrac{\pi}{2}$ when λ is

(a) $\dfrac{1}{4}$ (b) $\dfrac{1}{2}$

(c) $\dfrac{1}{8}$ (d) none of these

49. The function $f(x) = \dfrac{x}{1+|x|}$ is

(a) continuous for all x but not differentiable at $x = 0$

(b) continuous as well as differentiable for all x.

(c) neither continuous no differentiable at $x = 0$

(d) differentiable for all x but not continuous at $x = 0$

50. If $f(x) = \begin{cases} \sqrt{x}\left(1 + x\sin\dfrac{1}{x}\right), & x > 0 \\ -\sqrt{-x}\left(1 + x\sin\dfrac{1}{x}\right), & x < 0 \\ 0, & x = 0 \end{cases}$, then $f(x)$ is

(a) continuous as well as differentiable at $x = 0$

(b) continuous but not differentiable at $x = 0$

(c) differentiable but not continuous at $x = 0$

(d) neither continuous nor differentiable at $x = 0$.

51. If $f(x) = \begin{cases} \dfrac{x}{1+|x|}, & |x| \geq 1 \\ \dfrac{x}{1-|x|}, & |x| < 1 \end{cases}$, then $f(x)$ is

(a) discontinuous and non-differentiable at $x = -1$, 1 and 0

(b) discontinuous and non-differentiable at $x = -1$, where as continuous and differentiable $x = 0$ and $x = 1$

(c) discontinuous and non-differentiable at $x = -1$ and $x = 1$, whereas continuous and differentiable at $x = 0$

(d) none of these

52. If $y = \log_5 \log_5 x$, then $\dfrac{dy}{dx}$ is equal to:

(a) $\dfrac{1}{(\log 5)^2}\,\dfrac{1}{x\log x}$ (b) $\dfrac{1}{(\log 5)(\log_e x)}$

(c) $\dfrac{1}{(\log 5)\,x}$ (d) none of these

53. If $x = f(t)$, $y = \phi(t)$, then $\dfrac{d^2y}{dx^2}$ is equal to

(a) $\dfrac{f_1\phi_2 - \phi_1 f_2}{f_1^2}$ (b) $\dfrac{f_1\phi_2 - \phi_1 f_2}{f_1^3}$

(c) $\dfrac{\phi_1 f_2 - f_1\phi_2}{f_1^3}$ (d) none of these

54. If $\sin(x + y) = \log(x + y)$ then $\dfrac{dy}{dx}$ equals

(a) 0 (b) 1

(c) – 1 (d) none of these

55. If $y = \sin^{-1}\left(\dfrac{5x + 12\sqrt{1-x^2}}{13}\right)$, then $\dfrac{dy}{dx}$ is equal to

(a) $\dfrac{1}{\sqrt{1-x^2}}$ (b) $-\dfrac{1}{\sqrt{1-x^2}}$

(c) $\dfrac{3}{\sqrt{1-x^2}}$ (d) none of these

56. If the slope of the curve $y = \dfrac{ax}{b-x}$ at the point (1, 1) is 2, then the values of a and b are

(a) 1, – 2 (b) – 1, 2

(c) 1, 2 (d) none of these

57. If the normal to the curve $y = f(x)$ at the point (3, 4) makes an angle $\dfrac{3\pi}{4}$ with the positive x-axis, then $f'(3) =$

(a) – 1 (b) $-\dfrac{3}{4}$

(c) $\dfrac{4}{3}$ (d) 1

58. On the interval [0, 1], the function $x^{25} \cdot (1 - x)^{75}$ takes its maximum value at the point

(a) 0 (b) $\dfrac{1}{4}$

(c) $\dfrac{1}{2}$ (d) $\dfrac{1}{3}$

59. The angle at which the curves $y = \sin x$ and $y = \cos x$ intersect in $[0, \pi]$ is

(a) $\pm\tan^{-1} 2\sqrt{2}$ (b) $\pm\tan^{-1}\sqrt{2}$

(c) $\pm\tan^{-1}\left(\dfrac{1}{\sqrt{2}}\right)$ (d) none of these

60. $\displaystyle\int \frac{dx}{x\left(x^n + 1\right)}$ is equal to

(a) $\log x - \dfrac{1}{n}\log(x^n + 1) + C$

(b) $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right)+C$

(c) $\log x+\frac{1}{n}\log(x^n+1)+C$

(d) none of these

61. $\int[\sin(\log x)+\cos(\log x)]\,dx$ is equal to

(a) $\sin(\log x)+\cos(\log x)+C$

(b) $x\sin(\log x)+C$

(c) $x\cos(\log x)+C$

(d) none of these

62. $\int\frac{dx}{\sqrt{\sin^3 x\sin(x+\alpha)}}$ is equal to

(a) $2\operatorname{cosec}\alpha\sqrt{\cos\alpha+\sin\alpha\cot x}+C$

(b) $-2\operatorname{cosec}\alpha\sqrt{\cos\alpha+\sin\alpha\cot x}+C$

(c) $\operatorname{cosec}\alpha\sqrt{\cos\alpha+\sin\alpha\cot x}+C$

(d) None of these

63. $\int\left(\sqrt{\tan x}+\sqrt{\cot x}\right)dx$ is equal to

(a) $\sin^{-1}(\sin x-\cos x)+C$

(b) $\sqrt{2}\sin^{-1}(\sin x-\cos x)+C$

(c) $\sqrt{2}\cos^{-1}(\sin x-\cos x)+C$

(d) none of these

64. If $\int_0^1 e^{x^2}(x-\alpha)\,dx=0$, then

(a) $1<\alpha<2$ (b) $\alpha<0$

(c) $0<\alpha<1$ (d) $\alpha=0$

65. $\int_{1/2}^{2}\frac{1}{x}\operatorname{cosec}^{101}\left(x-\frac{1}{x}\right)dx=$

(a) 1/4 (b) 1

(c) 0 (d) 101/2

66. The value of the integral $\int_0^{\pi/2}\frac{1+2\cos x}{(2+\cos x)^2}\,dx$ is

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{-1}{2}$ (d) $\frac{-1}{4}$

67. $\int_0^2\sin\frac{\pi[x]}{2}\,dx$ is equal to

(a) 1 (b) – 1

(c) 0 (d) none of these

68. The differential equation of all circles passing through the origin and having their centres on the x-axis is

(a) $y^2=x^2+2xy\frac{dy}{dx}$ (b) $y^2=x^2-2xy\frac{dy}{dx}$

(c) $x^2=y^2+xy\frac{dy}{dx}$ (d) none of these

69. The general solution of the differential equation

$$\frac{dy}{dx}+y\,g'(x)=g(x).\,g'(x),$$

where $g(x)$ is a given function of x, is

(a) $g(x)+\log[1+y+g(x)]=C$

(b) $g(x)+\log[1+y-g(x)]=C$

(c) $g(x)-\log[1+y-g(x)]=C$

(d) none of these

70. The degree of the differential equation of all tangent lines to the parabola $y^2=4ax$ is

(a) 1 (b) 2

(c) 3 (d) none of these

71. The degree of the differential equation

$$\frac{d^3y}{dx^3}+x\left(\frac{dy}{dx}\right)^4=4\log\left(\frac{d^4y}{dx^4}\right)\text{ is}$$

(a) 1 (b) 3

(c) 4 (d) none of these

72. The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer, is

(a) 16 (b) 8

(c) 4 (d) 2

73. If $z=x+iy$ and 'a' is a real number such that $|z-ai|=|z+ai|$, then locus of z is

(a) x-axis (b) y-axis

(c) $x=y$ (b) $x^2+y^2=1$

74. If 1, ω, ω^2 be the three cube roots of unity, then $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8)$ ... to $2n$ factors =

(a) 1 (b) – 1

(c) 0 (d) none of these

75. $\left(\frac{\sqrt{3}+i}{2}\right)^6+\left(\frac{i-\sqrt{3}}{2}\right)^6=$

(a) – 2 (b) 2

(c) – 1 (d) 1

76. The number of terms common to two A.P.s 3, 7, 11, ..., 407 and 2, 9, 16, ..., 709 is

(a) 21 (b) 28

(c) 14 (d) none of these

77. The sum of all natural numbers less than 200, that are divisible neither by 3 nor by 5, is

(a) 10730 (b) 10732

(c) 15375 (d) none of these

78. The sum S_n to n terms of the series

$\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots$ is equal to

(a) 2^n-n-1 (b) $1-2^{-n}$

(c) $2^{-n}+n-1$ (d) 2^n-1

79. If a is the first term, d the common difference and S_k the sum to k terms of an A.P., then for $\frac{S_{kx}}{S_x}$ to be independent of x

(a) $a=2d$ (b) $a=d$

(c) $2a=d$ (d) none of these

80. If $a+b+c=0$ and a, b, c are rational, then the roots of the equation

$(b+c-a)x^2+(c+a-b)x+(a+b-c)=0$ are

(a) rational (b) irrational

(c) imaginary (d) equal

81. The value of m for which the roots of the equation $x^2+(m-2)x+m+2=0$ are in the ratio 2 : 3, is

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$

(c) $\frac{26}{3}$ (d) $-\frac{26}{3}$

82. In a quadratic equation with leading coefficient 1, a student reads the coefficient 16 of x wrongly as 19 and obtain the roots as – 15 and – 4. The correct roots are

(a) 6, 10 (b) – 6, –10

(c) – 7, – 9 (d) none of these

83. If the roots of the equation $\frac{1}{x+p}+\frac{1}{x+q}=\frac{1}{r}$ are equal in magnitude and opposite in sign, then

(a) $p+q=r$

(b) $p+q=2r$

(c) product of roots $=-\frac{1}{2}(p^2+q^2)$

(d) none of these

84. In a certain test, a_i students gave wrong answers to at least i questions where $i=1, 2, 3, ..., k$. No student gave more than k wrong answers. The total number of wrong answers given is

(a) $a_1+a_2+...+a_k$ (b) $a_1+a_2+...+a_{k-1}$

(c) $a_1+a_2+...+a_{k+1}$ (d) none of these

85. A gentleman invites 13 guests to a dinner and places 8 of them at one table and remaining 5 at the other, the tables being round. The number of ways he can arrange the guests is

(a) $\frac{11!}{40}$ (b) 9!

(c) $\frac{12!}{40}$ (d) $\frac{13!}{40}$

86. The sum of the digits in the unit place of all the numbers formed with the help of 3, 4, 5, 6 taken all at a time is

(a) 432 (b) 108

(c) 36 (d) 18

87. The number of words that can be formed from the letters of the word DAUGHTER so that the vowels always come together, is

(a) 4320 (b) 3470

(c) 5230 (d) none of these

88. The sum of the coefficients in the expansion of $(1+5x-7x^3)^{3165}$ is

(a) 1 (b) 2^{3165}

(c) 2^{3164} (d) – 1

89. The greatest term (numerically) in the expansion of $(2+3x)^9$, when $x=\frac{3}{2}$, is

(a) $\frac{5\times 3^{11}}{2}$ (b) $\frac{5\times 3^{13}}{2}$

(c) $\frac{7\times 3^{13}}{2}$ (d) none of these

90. The greatest coefficient in the expansion of $\left(x+\frac{1}{x}\right)^{2n}$ is

(a) $\frac{1\cdot 3\cdot 5...(2n-1)\cdot 2^n}{n!}$

(b) $\frac{2n!}{(n!)^2}$

(c) $\frac{n!}{\left(\left(\frac{n}{2}\right)!\right)^2}$ (d) none of these

91. If $(1+x-2x^2)^6=1+a_1x+a_2x^2+...+a_{12}x^{12}$, then $a_2+a_4+a_6+...+a_{12}=$

(a) 21 (b) 11

(c) 31 (d) none of these

92. The coefficient of x^n in the expansion of $\frac{e^{7x}+e^x}{e^{3x}}$ is:

(a) $\frac{4^{n-1}+(-2)^n}{n!}$ (b) $\frac{4^{n-1}+2^n}{n!}$

(c) $\frac{4^{n-1}+(-2)^{n-1}}{n!}$ (d) $\frac{4^n+(-2)^n}{n!}$

93. The value of

$\left(1+\frac{1}{2!}+\frac{1}{4!}+...\right)^2-\left(1+\frac{1}{3!}+\frac{1}{5!}+...\right)^2$ is

(a) 2 (b) – 2

(c) 1 (d) – 1.

94. If α, β are the roots of the equation $x^2-px+q=0$, then

$(\alpha+\beta)x-\frac{\alpha^2+\beta^2}{2}x^2+\frac{\alpha^3+\beta^3}{3}x^3$ ... is equal to

(a) $\log(1+px+qx^2)$ (b) $\log(1-px+qx^2)$

(c) $\log(1+px-qx^2)$ (d) none of these

95. $\frac{1}{2}x^2+\frac{2}{3}x^3+\frac{3}{4}x^4+\frac{4}{5}x^5+...$ is

(a) $-\frac{x}{1+x}+\log(1+x)$

(b) $\frac{x}{1+x} + \log(1+x)$

(c) $\frac{x}{1-x} + \log(1-x)$

(d) none of these

96. If $A = \begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$, $n \in N$, then A^{4n} equals

(a) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

97. Which of the following is correct

(a) $B' AB$ is symmetric if A is symmetric

(b) $B' AB$ is skew-symmetric if A is symmetric

(c) $B' AB$ is symmetric if A is skew-symmetric

(d) $B' AB$ is skew-symmetric if A is skew-symmetric

98. Which of the following is correct ?

(a) skew symmetric matrix of even order is always singular

(b) skew symmetric matrix of odd order is non-singular

(c) skew symmetric matrix of odd order is singular

(d) none of the above

99. If A is a square matrix such that $A^2 = I$, then A^{-1} is equal to

(a) $A + I$ (b) A

(c) O (d) $2A$

100. Let $A = \begin{pmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{pmatrix}$ be an orthogonal matrix then the values of a, b, c are

(a) $b = \pm \frac{1}{\sqrt{6}}, c = \pm \frac{1}{\sqrt{3}}$

(b) $a = \pm \frac{1}{\sqrt{2}}, c = \pm \frac{1}{\sqrt{6}}$

(c) $a = \pm \frac{1}{\sqrt{2}}, b = \pm \frac{1}{\sqrt{6}}$

(d) all of these

ANSWERS

1. (a)	2. (b)	3. (c)	4. (d)	5. (b)	6. (b)
7.(d)	8. (b)	9. (d)	10. (a),(b), (d)	11. (a)	12. (b)
13. (b)	14. (b)	15. (b)	16. (b)	17. (c)	18. (d)
19. (c)	20. (b)	21. (a)	22. (a)	23. (b)	24. (a)
25. (b)	26. (a)	27. (a)	28. (a)	29. (b)	30. (a)
31. (a)	32. (a)	33. (b)	34. (a), (c)	35. (c)	36. (a)
37. (a)	38. (a)	39. (b)	40. (d)	41. (b)	42. (c)
43. (b)	44. (a)	45. (b)	46. (a)	47. (c)	48. (d)
49. (d)	50. (c)	51. (b)	52. (b)	53. (a)	54. (c)
55. (c)	56. (b)	57. (b)	58. (a)	59. (b)	60. (c)
61. (c)	62. (b)	63. (a)	64. (c)	65. (c)	66. (b)
67. (a)	68. (a)	69. (b)	70. (b)	71. (d)	72. (a)
73. (a)	74. (a)	75. (a)	76. (c)	77. (b)	78. (c)
79. (c)	80. (a)	81. (b), (c)	82. (b)	83. (b), (c)	84. (a)
85. (d)	86. (b)	87. (a)	88. (d)	89. (c)	90. (a), (b)
91. (c)	92. (d)	93. (c)	94. (a)	95. (c)	96. (c)
97. (a), (b)	98. (c)	99. (b)	100. (d)		